

**Adapted from:** Air Pollution and Acute Respiratory Infections Among Children 0-4 Years of Age: An 18-Year Time-Series Study (2014)  
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## Introduction and Purpose

Air pollution may lead to respiratory infections by causing damage to the airway, increasing risk for infection. Air pollution may also worsen an existing respiratory infection by causing further inflammation of the airways. Outdoor air pollution may affect children more than adults because children breathe faster, have narrower airways, and their lungs and immune systems are still developing. They also spend more time outside than adults. The 2014 study looked at whether changes in the amount of outdoor air pollution are related to emergency room (ER) visits for **respiratory infections** in children 0-4 years of age.

## How the Study Was Done (Methods)

The daily number of ER visits for various **respiratory infections** among children 0-4 years of age were collected from 41 Atlanta-area hospitals over an 18-year period (from 1993–2010). Daily pollution measurements were collected from air monitoring stations in the same area.

Daily averages of air pollution (including **primary traffic pollutants** and **PM<sub>2.5</sub>**) were compared with the number of daily ER visits for pneumonia and other **respiratory infections** among infants less than 1 year and young children 1-4 years old.

## Results of Study

There were more ER visits for **respiratory infections** in children age 0-5 years old on days with high levels of **primary traffic pollutants, ozone,** and **PM<sub>2.5</sub>**. **PM<sub>2.5</sub>** is made of many different materials and this study found that the carbon portion of **PM<sub>2.5</sub>** was especially harmful.


For all outcomes, the impact was higher in children aged 1-4 years compared with infants less than 1 year of age. Some of these results were **statistically significant**, others were not. For more details, see page Table 4 in the original article.

## Limitations (Why we can't draw stronger conclusions)

It is often difficult to diagnose **respiratory infections** in young children, so the ER data may not accurately describe the number of respiratory infections in children. Also, the amount of outdoor air pollution a young child is exposed to depends on how much time he or she spends outside. Since this study did not have information about how much time children spent outside each day, we cannot know for sure how much outdoor air pollution the children were truly exposed to.

Additionally, many children do not visit the ER for **respiratory infections**. Therefore, this study can't say if outdoor air pollution is related to an increase in respiratory infections in children who did not visit the ER.

## What does this mean?

 While it is hard to draw strong conclusions from one study, this Atlanta-based study suggests that outdoor air pollution from traffic, **ozone,** and the carbon portion of **PM<sub>2.5</sub>** contribute to an increase of **respiratory infections** in children 0-5 years old. Days with high air pollution levels may be particularly harmful for children ages 1-4 years old.

## Key Words

**Respiratory infections:** An infection of organs used for breathing (i.e. organs from the nose to the lungs). Illnesses include the common cold, pneumonia, and many others. Symptoms may be shortness of breath, weakness, fever, and coughing.

**Primary traffic pollutants:** Air pollution that comes directly from car emissions such as nitrogen dioxide and carbon monoxide.

**PM<sub>2.5</sub>:** Particulate matter 2.5 are very small particles of dust, metals, pollen, smoke, and liquid droplets that are less than 2.5  $\mu\text{m}$  in diameter. 1  $\mu\text{m}$  =  $10^{-6}$  meter, or one millionth of a meter.

**Ozone:** Ozone is an inorganic molecule made up of three oxygen atoms. Its chemical formula is  $\text{O}_3$ . In the upper atmosphere, a band of ozone known as "the ozone layer" protects us from the sun's harmful ultraviolet (UV) radiation. At ground level, ozone ( $\text{O}_3$ ) is a key ingredient of smog and it is a toxic pollutant that can damage health. It forms when sunlight strikes a mixture of other pollutants like emissions from industrial facilities, electric utilities, car exhaust, gasoline vapors, and chemical thinners.

**Statistically significant:**

A statistical term that means there is enough evidence that the results obtained were not likely due to chance.

## Tips

If you have children between the ages of 0 - 4 years, be sure to talk to your doctor if you think they have a **respiratory infection**.

If possible, try to limit time outdoors on days with high levels of air pollution and **ozone**. You can check your local air pollution level by watching your local weather station or searching EPA's Air Now website: <https://www.airnow.gov/>

Read the full article here: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4224364/>

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